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## FORUM

### MAINTAINING SHEEP DURING DROUGHT WITH COMPUTER FORMULATED RATIONS: COMMENT

D. H. White and H. Jeffery\*

At a symposium discussion on economic models and agricultural production systems, Reeves and Willoughby [2] reported that

*“ . . . there still exists a wide gap between biologists and economists, not only in their objectives but also in their conceptual understanding of, and approach to agricultural problems.”*

The paper by Vere [4] contains several examples of pitfalls that may be encountered in using linear programming techniques if the system under study is not fully considered.

The maximum energy intake constraint for the maintenance of dry adult sheep was specified by Vere as 1,200 Kcal/head/day. We therefore point out that on page 87 he has made a misleading and invalid economic comparison of feeding a pollard-based ration (1,000 Kcal/head/day) with the “usual feed rate” of wheat of 1 lb/head/day (1,430 Kcal/head/day). This level of wheat feeding contains 19 per cent more energy than the maximum permitted by the programme. It is therefore not surprising that wheat would have to be purchased at 65c/bushel or less to be regarded as an “economic strategy”.

The invalidity of the comparison is highlighted by Vere's computation that wheat would enter the optimal solution at 31c/10 kg (84c/bushel, not 90c—page 86). This is 30 per cent more than the price implied from table 8.

Pollard comprises over 97 per cent of Vere's programmed solution. Before this solution was accepted as both optimal and practical the physical nature of pollard should have been considered. Vere's estimation of the cost of pollard is probably biased in that losses associated with handling and feeding were not considered. Digestive disturbances that could reduce the profitability of this feedstuff include acidosis and the possibility of a pasting and clogging effect in the rumen (Sheehy [3]).

The statement (page 89) that because pollard is a wheat derivative it “must, therefore, have the same degree of price stability” (as wheat) is simply not a logical deduction. Pollard is a derivative of the *milling* of wheat, being the portion between the skin or bran and the white interior. As the annual requirements for milled wheat and thus the production of pollard are fairly constant (BAE [1]) it is probable that the price of pollard will be sensitive to demand. In any case, most of the larger flour mills now incorporate all their available pollard into stock feeds for pigs and poultry.

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REFERENCES

- [1] BAE, "The Wheat Situation", (July, 1972).
- [2] REEVES, G. W. and W. M. WILLOUGHBY, "Discussion on Economic Models and Agricultural Production Systems", *Proc. Aust. Soc. Anim. Prod.* Vol. 9, (1972), pp. 133-134.
- [3] SHEEHY, E. J., *Animal Nutrition* (London: MacMillan and Co., 1955).
- [4] VERE, D. T., "Maintaining Sheep during Drought with Computer Formulated Rations", *This Review*, Vol. 40, (June, 1972), pp. 79-94.

**MAINTAINING SHEEP DURING DROUGHT WITH COMPUTER FORMULATED RATIONS: REPLY**

D. T. Vere\*

Reeves and Willoughby [1] have provoked considerable interest by accentuating the conceptual difficulties experienced by biologists and economists in the cognizance of agricultural problems. The efforts of White and Jeffery to bear due testimony to this hypothesis via their criticism of the above paper, provides a rare opportunity for this author to find himself in total rapport with the philosophy yet sceptical of the "economic" evidence, propounded by the critics to substantiate it. It is indeed surprising that biologists such as the critics are prepared to invalidate the findings of an economically orientated piece of research on the basis of several seemingly minor considerations. It does indeed lend further credence to the original hypothesis. The following points are offered by means of clarification.

The comparison of feeding strategies referred to on page 87 was never intended to be equated on a nutritional basis—especially with respect to energy considerations. Because wheat feeding at the various recommended levels enjoys widespread acceptance, it was naturally assumed to be adequate for the purpose of maintenance. Therefore a pure cost per head basis comparison was felt to be in order, but this is undoubtedly where the confusion experienced by White and Jeffery arises. They appear to be overlooking two most important factors. Firstly, the computed ration and this whole wheat feeding strategy are *not* being compared on an equal energy basis. Therefore it matters not whether one pound of wheat supplies 19 per cent (or x per cent) more energy than the constrained maximum allowable with the computed rations.

What does matter is the relative costs of feeding alternative rations. The following table serves to illustrate the economics of feeding a pollard based ration.

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## FORUM

TABLE 1

*Costing Various Wheat Feeding Strategies (cents/day)*

Commonly recommended maintenance feeding strategy using wheat	Price of feedwheat/bu		
	Price used in article	Current AWB price	Concession price
	\$	\$	\$
1 lb/hd/day (1,430 Kcals energy/day) ..	1.52	1.84*	1.55†
4 food units/week (1,124 Kcals energy/day) ..	2.53	3.07	2.58
1,000 Kcals energy/day via wheat ..	1.98	2.40	2.01
	1.77	2.16	1.81

\* Refer *Australian Financial Review*, 6th December, 1972.

† Obtainable only if the buyer has an established patronage with the AWB.

Secondly (and most importantly), with even a rudimentary working knowledge of linear programming one immediately appreciates the fact that the technique must consider *all* the specified constraints and not just one—i.e. energy. Similarly, all feed inputs are considered on an equal basis.

Further confusion is revealed in paragraph 3 of the Comment. Admittedly the text may appear to be somewhat ambiguous. However, one should not confuse the concept of a sensitivity analysis with a straight comparison. At a price of 31c/10 kg (84c/bu) wheat forces out pollard as the basis of the solution *but* does not become the entire optimal solution itself as other ingredients will still come in. White and Jeffery's objection to the estimate of 90c/bu (in lieu of their correctly calculated 84c/bu) can probably be explained by rounding errors in the calculation.

Similarly, further concern for increasing ration prices from losses due to handling and feeding is doubtful. These should not be so great as to raise the cost of the ration to any appreciable level whereby it becomes sub-optimal. The sensitivity analysis provided shows that the price of pollard due to feeding loss can rise by 30 per cent and still remain optimal. Only grossly inefficient management could cause this to happen. The concern as to the stability of actual ingredient prices is open to conjecture but the author's inference remains as is. The ex-mill price of pollard (taken from the Division of Marketing and Economics price reporting section) has not varied one cent for at least 12 months which suggests a reasonable degree of price stability.<sup>1</sup>

<sup>1</sup> However, an alternative argument based on supply and demand elasticities may be advanced to lend partial support to White and Jeffery. In the case of wheat, the supply available for stock feeding purposes (at current prices and under current policies) can be assumed to be perfectly elastic relative to demand levels (within the total domestic supply of wheat). On the other hand pollard is a wheat derivative, the supply of which is regulated by the domestic flour industry. Thus, being a by-product of the milling process, the supply function for pollard would probably be perfectly inelastic. Then, assuming flour millers hold small stocks of pollard one could argue that demand is the main determinant of the price of pollard, whereas that of wheat is determined by policy.

Physical nutritional considerations are not within the bounds of this author's professional competence and accordingly, reliance on the accurate specification of such aspects has been placed with those (acknowledged in the paper) whose expertise is well documented. Furthermore, a considerable volume of correspondence received to date has given little cause for alarm.

## REFERENCES

- [1] REEVES, G. W. and W. M. WILLOUGHBY, "Discussion on Economic Models and Agricultural Production Systems", *Proc. Aust. Soc. Anim. Prod.*, Vol. 9 (1972), pp. 133-134.
- [2] VERE, D. T., "Maintaining Sheep during Drought with Computer Formulated Rations", *This Review*, Vol. 40 (June, 1972), pp. 79-94.